

Hello my name is Brenna and I will be your virtual tour guide!



Libby Dam spans the Kootenai River 17 miles upstream from the town of [Libby](#) in the heart of beautiful northwest Montana. The [US Army Corps of Engineers](#) built and operates the dam for flood control, hydropower and recreation. The dam's reservoir, Lake Koocanusa, is a total of 90 miles long and extends 42 miles into British Columbia, Canada.

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Libby Dam

Libby Dam is the culmination of years of effort on the part of both the United States and Canada to develop a flood control plan for the Columbia River basin. The Kootenai River is the third largest tributary of the Columbia River, contributing almost 20 percent of the total water in the lower Columbia. The dam stands 422 feet tall and about one-half mile long and creates a reservoir (Lake Koocanusa) which extends well into Canada. In profile, Libby Dam is shaped like a right-angle triangle, measuring 310 feet wide at the base and 54 feet wide at the crest. Libby Dam construction began in 1966 and the dedication ceremony in 1975 marked the beginning of commercial power generation. The dam is a straight-axis, concrete-gravity dam--a technical way of saying that it extends straight across the canyon (rather than forming an arch), and that it holds back the force of the water with a large mass of concrete (as opposed to relying on its geometric shape); there are 7.6 million tons of concrete in Libby Dam. Close examination of the dam reveals a number of vertical lines running down the face of the dam. Each of these lines marks a monolith section, or individual dam. The 47 monoliths in Libby Dam act independently to hold back the water; thus, they can freely move relative to one another and will maintain their strength even if adjacent sections fail.

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You may notice a number of hinged doors and hatches in the roadway. The largest of these doors serve as access hatches for the Penstock pipes which pass through the dam as they carry water from the reservoir into the powerhouse turbines. There are eight penstocks (one for each planned generator), each measuring 20-feet in diameter with a 2 1/2 inch steel wall. The smaller doors in the roadway store solid penstock gates and provide access to controls. If an operator desires to stop the flow of water through one of the eight penstock pipes, the large 135-ton Gantry crane will open an access hatch and then lift a gate out of a storage hatch. When this gate is dropped through the slot, it is lowered over one-hundred feet

before landing in front of the penstock and stopping the flow of water.

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Selective Withdrawal System



The smaller of the two cranes (20 ton capacity) on top of the dam is part of the selective withdrawal system. This system allows a dam operator to select water from various lake levels, thus providing accurate control

over downstream water temperature. Such control is needed during the warm summer months to benefit the downstream fishery. During the summer, the river is usually kept between 52 and 56 degrees according to a temperature curve developed for local trout. The selective withdrawal system consists of 14 slots, each with 21 gates or bulkheads. If cooler temperatures are needed, bulkheads are removed from their slots in the withdrawal system, allowing water to be drawn from deep in the lake (where it is cooler). For warmer water, bulkheads are added, allowing water nearer the lake surface to be drawn into the system. Kootenai River water quality is routinely tested to check the effectiveness of the system. Perhaps the best evidence of all, however, is that the past two state record Rainbow Trout were caught directly below the dam!

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Treaty Tower Sculpture



Since Libby Dam backs up water 42 miles into Canada, a treaty was established between the governments of Canada and the United States before the dam was built. This treaty is known as the Columbia River Treaty, and

it paved the way for cooperative development of the Columbia River basin while simultaneously aiding future negotiations between the two countries. The Treaty Tower on Libby Dam (the larger of the dam's two towers) is named in honor of the Columbia River Treaty and is distinguished by the 70-ton granite sculpture on its face. An international committee chose the Albert Wein design from a contest field of 250 entries. The sculpture symbolizes the natural and man-made forces on the Kootenai River, and commemorates the Treaty. The man pictured is a Native American (the Kutenai Indians were the first people on this land), while the rearing horses he is holding back represent the river's power; this figure symbolizes humankind's ability to work with nature and to harness the power of nature. Other symbols of nature in the sculpture include the Canada Geese; the clouds and rain; and the fish which, of course, also allude to the water which makes Libby Dam possible. Finally, as a symbol of the Treaty between Canada and the United States, there is a bald eagle on the lower left corner and, opposite that, a Canadian maple leaf in the lower right corner.

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Spillways_Sluiceways





The two spillways and three sluiceways allow the dam to release excess water from the reservoir without passing it through the generators; the spillways release water from the top of the reservoir while the sluiceways release water from the bottom. These systems are designed for emergency use only--situations where Lake Koocanusa is full and there is more water entering the reservoir than can be passed through the generators. Normally, it is preferable to pass the water through the generators since it can be used to make electricity and since it avoids pushing extra nitrogen (nitrification) into the water which can kill fish. Each spillway gate is 48 feet wide by 56 feet high and can be opened as much as 54 feet. At full capacity, the spillways can pass well over 1.2 million gallons of water every second! The stilling basin is located directly below the spillway/sluiceway sections and slows the water's velocity in order to prevent downstream erosion.

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The Powerhouse





Construction of Libby

Dam's powerhouse began in May of 1972 and continued through 1985 with the completion of Unit #5. The powerhouse wall panels, spandrel, beams and roof Ts were prefabricated in Spokane, Washington (153 miles away) and assembled in Libby. The large crane in the powerhouse has a 300-ton capacity. It is used for installing, repairing and maintaining the generators, turbines, and shafts. The crane rides on rails and is electrically operated. All dam operations are controlled and monitored in the Control Room. There is always an operator on duty in the Control Room. The powerhouse also includes a secondary sewage treatment plant, a complete chemical and biological laboratory, the administrative office, and mechanical, electrical, welding, sheet metal and carpentry shops.

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Generator Rotor

Large penstock pipes carry the water from the reservoir to the lower level of the powerhouse. As these pipes approach the turbines, they enter a scrollcase which wraps around like a snailshell, decreasing the pipes' diameter from 20 feet to just 3 feet. Then, the high-pressure water hits against the turbine fins which resembles an old-fashioned water-wheel turned on its side. As this wheel spins, it turns a large vertical shaft. At the other end of this shaft is the rotor--a large circular structure which supports a series of electro-magnets. The free-standing rotor is surrounded by a stationary stator which contains miles of copper coils. As the

force of the water spins the rotor inside of the stator, the revolving magnetic field causes electrons to move and electrical energy is produced.

Libby Dam's powerhouse contains five Francis-type turbines, each with a capacity of 120 megawatts (120 million watts). At peak times, the dam can generate 600 megawatts. Considering that an average lightbulb is 60 or 75 watts, that's a lot of electricity--enough to light 500,000 homes!

After Libby Dam generates the electricity, it is sent to large transformers which boost the voltage from 13,800 volts to 240,000 volts for transmission. The electricity travels a short distance from the dam to a switchyard operated by the Bonneville Power Administration or BPA. BPA is a United States government agency which sells electricity "at whole sale price" to private utilities and other users. The electricity produced at Libby Dam services eight states including: Montana, Idaho, Washington, Wyoming, California, Utah, Oregon and Nevada.

The money earned from electricity sales goes to the United States Treasury and will repay the cost of building and operating Libby Dam.

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Come visit us again!

Well, that's the end of the tour. Thank you very much for taking the time to visit our project. Please browse our web site and feel free to offer your comments and suggestions. Of course, the best way to experience all that Libby Dam has to offer is to visit us in person. So next time your in Northwest Montana or Southern B.C., stop by and enjoy the many sights and activities -- we think you will be pleasantly surprised!

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[Libby Dam and Lake Koocanusa Statistics](#)

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